

Appln. No. 10/762,124
Amdt. dated: October 27, 2004
Reply to Office Action dated September 24, 2004

Remarks/Arguments

These remarks are in response to the Office Action dated September 24, 2004. This reply is timely filed. At the time of the Office Action, claims 1-18 were pending in the application. Claims 1-10 were allowed. Claims 13-15 and 17 were objected to as being dependent upon a rejected base claim, but were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 11, 12, 16 and 18 were rejected under 35 U.S.C. 103(a). The rejections are set out in more detail below.

I. Brief Review of Applicants' Invention

Prior to addressing the Examiner's rejections on the art, a brief review of applicant's invention is appropriate. The present invention relates to an efficient fabrication process for embedding an optical band gap (OBG) structure within a ceramic substrate. More particularly, a surface coating of a surface binding material is applied to the OBG structure, and the OBG structure is disposed in the ceramic substrate prior to the ceramic substrate being sintered. The surface binding material binds the OBG structure to the ceramic substrate during the sintering process. Accordingly, the present invention enables the OBG structure to be bonded to the ceramic structure while the ceramic structure is sintered, thus providing a cost effective solution for implementing OBG structures within RF and microwave circuits.

II. Claim Rejections on Art

Claims 11, 12, and 16 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,766,082 to Hirabayashi et al. ("Hirabayashi") in view of U.S. Patent No. 6,406,196 to Uno et al. ("Uno"). Claim 18 was rejected under 35 U.S.C. 103(a) as being unpatentable over Hirabayashi in view of Uno and further in view of U.S. Patent No. 5,661,647 to Washburn et al.

Hirabayashi discloses a technique for mounting surface-normal optical devices or materials on a waveguide-type optical device. In particular, Hirabayashi discloses forming a trench in the surface of a waveguide substrate. A pair of electrodes can be

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formed from the surface of the substrate to one of the sidewalls of the trench. The surface-normal optical device then can be inserted into the trench, making contact with the pair of electrodes.

Uno discloses an optical device which includes a substrate having an optical fiber disposed in at least one groove formed within the substrate. A second groove is provided in the substrate which diagonally traverses the optical fiber. An optical member which has a surface reflecting or diffracting at least a part of light propagating through the optical fiber is inserted into the second groove. The optical member is fixed to the waveguide substrate using a UV curable resin.0.

Amended claim 11 recites a ceramic substrate comprising an optical bandgap (OBG) structure having a surface coating of a surface binding material comprising hexane. The use of hexane enables the OBG structure to be disposed in the ceramic substrate prior to sintering of the ceramic substrate. Neither Hirabayashi or Uno, nor their combination, teach or suggest this limitation. Uno discloses an optical device disposed in a groove of a substrate, but the optical device is secured with a UV cured resin, and thus must be secured to the substrate after the substrate has been sintered. More particularly, ceramic substrates are sintered at approximately 875° C or higher. UV cured resins are not suitable for use at such temperatures, and typically must NOT be exposed to temperatures higher than 145° C. Such resins will begin to break down if exposed to higher temperatures. In consequence, the combination of Hirabayashi and Uno fails to teach or suggest a ceramic substrate comprising an OBG structure having a surface coating of a surface binding material comprising hexane. Applicant therefore requests that the rejection of claim 11 be withdrawn. Applicant further requests that the rejection of claims 12, 16 and 18 be withdrawn since they depend from claim 11, which is believed to be in condition for allowance.

III. Allowable Subject Matter

Claims 1-10 were allowed. Claims 13-15 and 17 were objected to as being dependent upon a rejected base claim, but were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 13 and 17 have been amended accordingly. Claims 14 and 15 depend

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from claim 13. Thus, claims 13-15 and 17 are now in condition for allowance and the Applicant requests the claim objections be withdrawn.

IV. Conclusion

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. Nevertheless, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. In view of the foregoing remarks, Applicants respectfully requests reconsideration and prompt allowance of the pending claims.

Respectfully submitted,

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